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Conflict Management of Renewable Natural Resources in the Border of Indonesia-Malaysia: Sustainable Environmental Approach

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Abstract

Limitations and abundance of natural resources have become some of the conflict triggers of renewable natural resources at the border of Indonesia and Malaysia. There are fundamental differences between the conflicts over renewable natural resources and non-renewable natural resources especially in the border area. The renewable natural resource conflict is cyclical, while the non-renewable resources conflicts only apply temporarily in the same location. The analysis uses modification of RAFISH method by using multidimensional scaling (MDS) technique. This index indicates that only economic dimension is sustainable, legal and institutional dimensions are less sustainable and ecological, socio-cultural and technology dimensions are not sustainable. According to leverage analysis, it shows that there are some attributes such as leverage factor to ecological, socio-cultural and technology dimensions.

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1. Introduction

Limited natural resources are leading a state to seek a way to expand their territory. Conflicts between neighboring countries tend to be more likely intense and durable [1]. Conflicts over natural resource management across territorial borders have been going on a lot, for example the conflicts about oil in the Gulf War conflict, the conflicts on water consumption between Israel and Arab countries along Jordan and Orange River, the conflicts in Namibia, Lesotho, and South Africa [2].

In the future, conflicts over natural resources will be more massively with the limited natural resources. The need in fulfilling natural resources make each country fight to expand crossing the country's territorial to search and to satisfy its domestic needs. The awareness of the importance of a sustainable environment has started centuries ago, even now it is growing globally as people begin to realize that they live on the edge of resource extinction. The world witnessed the real indication of environmental issues and its effects.

Various forms of power interact and compete not only internationally but also intergenerationally. Environmental problems that occur will bring impact on all aspects of life so there will be no single country spared from it. It will go beyond administrative boundaries and geo-politics of a country and ignores the cause and source of damage.

Philosophically, the early Malthusian approach indicated that human population growth exceeds the availability of natural resources, especially food, which would lead to war, disease and hunger. This condition is a dilemma of civilization. Although nature has a carrying capacity of its own, it is the condition of population growth that exceeds the supply of resources may lead to conflicts [3].

In classical economic perspective on the use of natural resources, Green believes that the system of distribution based on supply and demand could arrange the setting that would effectively be able to cope with scarcity. Simply put, the classical economic perspective assumes as resources become scarcer as the price goes up so it will prevent over-consumption and spur the substitution and the development of technology [4].

Many areas have become the source of dispute or they deemed to have commodities or vital natural resources like mineral deposits, mining, petroleum, water or rich farmland. Certain areas are contested as they provide the access to the sea and to the commercial routes that play an important role in the world trade traffic. The population of a region is also significant to determine whether the region is important. Another remarkable advantage of a region is its contribution to national security.

Ironically, developing countries with abundant natural resources (including Indonesia) often struggle to meet the basic needs of their citizens due to poor natural resources management. Many researchers identified the abundance of resources would be one of the key determinants of natural resource conflicts. Abundance of natural resource for a country is just like misfortune. This is because of its poor natural resources management and the expansion from other countries [5].

The competition of palm oil management between Indonesia and Malaysia will increase along with rising demand of palm oil derivatives, such as cooking oil. Besides economic reason, ecologically Malaysian expansion of investment in Indonesia is the result of some plantation areas conversion in Malaysia into forest ecotourism and also to generate foreign exchange for the country itself. It can be said that Malaysia is a step further than Indonesia in terms of understanding paradigm related to environment. In Indonesia, ecological paradigm has not been implemented in the oil palm plantation opening. Economical and political reasons that overlap between investment and political interests lead the opening of oil palm plantation to meet the needs of palm oil and its derivatives will continue to rise.

Goldmann and Schurman [6] stated in their review, that nature-society that are related with needs, consider the ecological process, political-economic structure of values, component of analysis, and representatives as needed. Other reviews pointed out the political ecology as world system theory, a dependency theory with structural approach in form of concept of control and access to the resource, marginalization, granting the surpluses, and focusing on relation between production and power.

This environmental conflict is elaborated by Peluso [7], she reveals the forest management in Indonesia and Java island in particular. The greatest part of forest in Java is covered by teak forest, one of forest products with high quality and due to its scarcity it becomes an expensive commodity. The way the government manages the forest products causes some problems. Under the guise of sharing the forest products, the farmers have the right to

cultivate the land under the teak trees, but the teak wood products will still belong to the rulers and their alliances. As a result, the peasants in the forest remain in poverty despite living in the forest area, the great moneymaker.

It happens because the land under the teak forest is not a suitable one for agriculture. There are only certain plants that can grow well on that kind of land and those are not the essential ones. Being oppressed and desperate, the local communities are forced to illegally harvest the forest products. They steal the teak wood and sell them to the parties who willingly buy these stolen woods for high prices. The theft contributes to the rate of forest destructions [8].

Unlike the competition, which aims to maintain or to dominate, the conflict of natural resources is defined as relationship of two parties or more (individuals, groups, or countries) that have goals which are inconsistent and the odds are over the natural. In terms of differences of interest, conflict tends to be a trend in solving the problems, although in the end they bring out new problems [9]. Fisher says that the conflicts arise because of an imbalanced relationship among individuals, societies and countries that may lead the conflicts increase and develop to the greater scale [10].

Environment scarcity concept consists of three dimensions, i.e. supply-induced scarcity, demand-induced scarcity, and structural scarcity [11]. Supply-induced scarcity arises when the resources run out and the damage is faster than the speed to renew. Demand-induced scarcity arises due to rapid population growth accompanied by consumption growth per capita. Then structural scarcity arises when resources are distributed disproportionately related with an abundance of certain resources enjoyed by some people while others cannot enjoy the same.

For his/her survival, a human needs full support from his environment for fulfilling his primary, secondary and tertiary needs. However, along with increasing type and quantity of the needs and the growth of population, nature has limited resources to supply. This limitation encourages people to do more efforts to keep their needs fulfilled. The actions they take will eventually destroy the nature and reduce the existence of carrying capacity. Friction over other human interests even increases the arising problems.

Smith [12] pointed out that problems in economy including unemployment and poverty were blamed for the low economic growth according to normal political and economic point of view. To overcome these problems, the industry should be designed to create jobs and alleviate poverty. On the other hand, the industrial growth will increase further damage to the environment. The environmental damage that continues to occur weakens the carrying capacity of earth for the human population and decreases the quality of life, so it will be a dilemmatic interconnected cycle.

Anthropologists say that the social conflicts caused by scarcity of resources, especially agricultural land, triggered by differences on the principles of local people with the authority/state [13]. Utilization of natural resources, which exceeds the threshold and the carrying capacity of land without regard of the aspects of sustainability, leads to erosion and landslides, as is the case today.

Land use that exceeds the carrying capacity without conservation and improvement of land condition often leads to land degradation. For example, in the oil palm plantation, the upstream area would be much more used by the oil palm plantations because it requires vast water supply. Therefore, the upstream area is likely to be the most vulnerable to changes and land degradation. The reduced carrying capacity, as the capability of the environment to support the population life, including humans, becomes a real threat when the practice of land clearing and the land conversion into palm oil plantation ignore the principles of sustainability.

The ideological principles of the resources in the present environmental crisis are actually still in the frame of orthodox neoclassical economic principles, which believe that all economic problems arise because of the imbalance between the carrying capacity of life (in this case is the limited natural resources) and the rapid growth of needs. Theoretically, the human population should not grow, but develop to create a proper balance between the needs and carrying capacity of the environment and therefore there will be no over-exploitation of existing resources. Green [14] stated that over-consumption of natural resources is to be prevented by balancing demand and supply, so the rarer the item, the higher its price and therefore it can prevent the consumer to consume excessively. But in reality, if the price goes up, the humans' attempts to exploit the commodities will also increase until they reach the extinction.

2. Methods

Sustainability index measurements are used to explore the dimensions of ecological, social, economic, legal and institutional as well as technologies related to sustainable management of renewable natural resources. Operationalization of the fifth dimension seeks to show that the sustainable management of natural resources should be done in principle not only to reduce the impact of resource conflicts that have occurred, but also to prevent the conflicts that may arise. Sustainability measurement of natural resource management are intended to prevent conflicts and violence that mostly caused by the scarcity or abundance of natural resources, so that sustainability becomes an integral part that cannot be separated [15].

The birth of the concept of sustainable development has the dimension on how a sustainable future is prepared and integrated at the early stage. Sustainable development is a conscious and deliberate effort in order to guarantee the civilization may take place in the future. Aspects of social, economy and ecology are integrated and intersecting.

Sustainable perspective can be interpreted on how the economic sustainability scale support the ecological systems, the distribution of resources in the present time and for the future are arranged in a balanced and efficient allocation of natural resources. This condition is very important because the availability of resources in the future depends on the relations between human population and the availability of resources.

Sustainability index of natural resources management at the border (Rap-MRNRB) is an instrument for measuring the sustainability status in a theme or locus of research. This method uses the approach of Multi-Dimensional Scaling (MDS). This concept is actually modifying Rapid Appraisal Techniques for Fishery (RAPFISH) approach at the University of British Columbia which was initially to measure the sustainability of resources and fish catches [16]. Modifications conducted on RAPFISH techniques are tailored to this study. MDS is a method of computer-based statistical analysis techniques using statistical software programs on computers, which perform transformations on each dimension and multidimensional sustainable management of renewable natural resources at the border. Data analysis with MDS include the ecological sustainability, economic, social, legal and institutional and technology dimensions.

Sustainable perspective can be interpreted on how the economic sustainability scale support the ecological systems, the distribution of resources in the present time and for the future are arranged in a balanced and efficient allocation of natural resources. This condition is very important because the availability of resources in the future depends on the relations between human population and the availability of resources. Likewise the need for natural resources should be balanced and synergistic with benefits in the areas of ecology, social and economy [17]. The sustainability analysis of management of renewable natural resources in the border area done by multidimensional scaling (MDS) technic is called Rap-MRNRB. Rap-MRNRB analysis will show the index and sustainability status management of renewable natural resources in the border area as well as sensitive attributes that affect the sustainability of management of renewable natural resources in the border area with ecological, social culture, economic, legal and institutional, and technology dimension.

3. Result

Based on Table 1, each dimension and multidimensional has "stress" value which is much smaller than the provision which states that the "stress" value obtained a value of 25%. Because the "stress" value is getting smaller, the quality of analysis conducted is getting better. Contrast to the coefficient of determination (R^2), quality of the analysis gets better if the value of coefficient of determination is greater (close to 1). Thus from the second parameter (the value of "stress" and R^2) shows that all the attributes used in the analysis of sustainability are good enough in explaining the five dimensions of development analyzed.

Table 1. Result of Rap-MRNRB analysis

Dimensional	Sustainability Index		MDS and Monte Carlo Diferrence	Statistics Value		Iteration
	MDS	Monte Carlo		Stress	R ²	
Ecological Dimensions	4.56	4.67	0.11	0.12	0.95	2
Economic Dimensions	88.29	88.31	0.02	0.13	0.95	2
Socio-Cultural Dimensions	1.30	1.40	0.10	0.13	0.95	2
Technolgy Dimensions	15.49	15.55	0.06	0.13	0.95	2
Legal and institutional	31.57	31.81	0.24	0.13	0.95	2

This study used Montes Carlo analysis for testing the total index value of confidence level and each dimension. After many repetitions, apparently Monte Carlo analysis contained errors that did not make many changes to total index value and each dimension. Based on Table 1, it can be seen that the value of sustainability index status of resource management policies on the border region confidence interval 95% obtained results that do not experience any difference between the results of MDS analysis with Monte Carlo analysis. The small difference between the value of sustainability indexes MDS analysis method with Monte Carlo analysis indicates the following things: 1) error in each attribute score is relatively small; 2) scoring variations are relatively small due to differences of opinion, and 3) the analysis conducted by repetitive stable; 4) data entry errors and missing data can be avoided

This index indicates that only economic dimension is sustainable; legal and institutional less sustainable; and ecological, sociocultural, and technology dimensions are not sustainable. According to leverage analysis, it shows that there are some attributes as a leverage factor to ecological, socio cultural and technology dimension.

According to Salim [18], sustainable development is a positive social-economic change that does not ignore the ecological and social system where people rely on it. The successful implementation needs policy, planning and social learning processes in an integrated way. Development pattern that emphasizes only on economic growth tend to the exploitation of natural resources and a less controlled environment for the economic benefits alone. Therefore, the global awareness is manifested through a global agreement of Johannesburg declaration in 2002, specifically stressed the need for integration of the three pillars of development. They are social, economic, and environmental.

For the sustainability of natural resources management, the operationalization of sustainable development in the management of renewable natural resources must incorporate environmental aspects in the development planning process from the beginning, utilizing the approach and environmental considerations in the process of resource management nature at every stage of development and apply the principles of efficiency and conservation in each step and activity. Therefore, the sustainable management of natural resources in the management of renewable natural resources use ecological approach in order to generate economic and social benefits of renewable natural resources, preserve the environment while enhancing the skills, improve the quality of individuals and communities involved in the management of renewable natural resources [19].

Sustainable development must be done not only to reduce the impacts of resource conflicts that have occurred, but also to prevent the conflicts that may arise. Therefore, to prevent conflicts or violence mostly caused by the scarcity of natural resources, the environmental aspects should be considered [20]. In the sustainable natural resource management, the main finding of political ecology theory argues that patterns of resource development arise from interactions between natural systems (e.g. quality, quantity, and location of water) and social systems (e.g. the spread of economic power, social, and political in society). In the context of natural resource management on forests as the place of biodiversity, it can be a description to show us that we can use ecological mechanism of political progress, especially the owner of natural resources and the authority [21].

The global conflicts over natural resources mostly arise between two parties that share the natural resources between them. These two parties may be individuals or governments. Besides the issue of resources shared between two countries or more, the other factors that potentially cause the conflicts are scarcity of some resources, the rules which represent the resources, the importance and sacredness of a place, the design of regulation, the framework of regulation, uncertainty and disagreement over the science, political strategies and interest groups, media framework, the arrangement of notification/advertisement and distrust [22].

Natural resource management is required as a real effort to maintain environmental sustainability. Unfortunately, the pattern of management of the existing conflicts associated with natural resources is repressive [23] and is using

security approach [24] and do not touch the area of welfare and in the context of nationalism associated with sovereignty.

Schendel [25] wrote that the central authority of a country can be seen on how it manages the country's land borders. The border fence is not only a limit between two countries, but also plays a significant role. The role of the border as a corridor is constructed for strategic purposes or an area that is rarely known but has some potential. The potentials in the land border will arise problems between adjacent countries. Land on the land border is still regarded as ownerless. This raises the idea that anyone can manage it and this principle has become the main trigger in determining who has a right on it.

Based on Table 1, Walker [26] mentions that one type of peripheral resources may be encountered along the international borders with the geopolitical and strategic aspects usually located in all dimensions. Likewise, the land border in the present time is developed by the palm oil industry due to the rapidly increasing world demand on processed palm oil and palm oil as bio-energy. It becomes a problem for the world's two giants, Indonesia and Malaysia, since the two countries dominate global palm oil trade and production.

The palm oil conflict that has implication in environmental problems among the countries also has potential to threaten the sovereignty of a country. Homer-Dixon [27] coined the term as the weakening of a state. It occurs since the conflict in the country with energy resources will decrease a country's focus on other national issues such as health, education and others. If viewed from the sustainability status when criticized, the highest index value is economic sustainability, but in reality the sustainability is exploitative. The role of the state, people and market in natural resource management is an interconnected model of triangulation. This kind of relation is dynamic, if the state has power over corporation and people, it would lead to authoritarian state. On the other hand, if the corporation is stronger, it would dominate others as the result causing natural resource exploitation. When people are having power over the others, they would become dominant and lead to anarchy (Prayogo, 2006). Each side has their own interest and spirit to struggle which frame them into destructive behaviour so it is necessary to have hierarchy balance among the sides. The state is supposed to protect the market and people and they are also part of the system governed by state.

4. Closing

In the long term management of the renewable natural resources conflicts at the border, work plans should be made to combine all or some of the elements that explain the three main factors of vertical relationships (resource - collector - distributor) and horizontal relationships (between plantings-the main-ownership of other institutions). In opening oil palm plantations at the border, many targeting the upstream, because the oil palm needs plenty of water. The role of the government is increasingly visible when the regional government through their local apparatus organizes the management and utilization of natural resources. On the other hand, the role of local government in the formulation of major policies should be able to integrate the ecological, social, economic, legal and institutional dimensions as well as technology to support sustainable management of the environment and also to formulate the regulation and policies in determining the economic and political zones as well as confining those who can utilize the resources in each zone. Regional governments should be able to work in a collaborative way with the private and public parties. However, the security approach at the border area must be acceptable for welfare approach to support so the conflict management of natural resources at the border could not develop in greater scale. The local government plays a role in combining a holistic approach in developing renewable natural resources at the border by ensuring sustainability aspects synergistically. Moreover, the local government also has a role in conflict management of renewable natural resources at the border (by involving community and market) which is different from the other conflict management viewed from the dimensions of space, time and the parties involved.

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